A VIRTUAL COLLABORATIVE ENVIRONMENT FOR MARS SURVEYOR LANDING SITE STUDIES. V.C. Gulick[1,2], D. G. Deardorff[3], G. A. Briggs[2], K. P. Hand[4], and T. A. Sandstrom[3. 1]Space Science Division, MS 245-3, [2]Center for Mars Exploration, MS 239-20, [3] NAS Data Analysis Group, MS T27A-1, [4]Center for Bioinformatics, MS 239-11. All are at NASA-Ames Research Center, Moffett Field, CA 94035. *Email:* vgulick@mail.arc.nasa.gov.

INTRODUCTION: Over the past year and a half, the Center for Mars Exploration (CMEX) at NASA Ames Research Center (ARC) has been working with the Mars Surveyor Project Office at JPL to promote interactions among the planetary community and to coordinate landing site activities for the Mars Surveyor Project Office. To date, CMEX has been responsible for organizing the first two Mars Surveyor Landing Site workshops, web-archiving resulting information from these workshops, aiding in science evaluations of candidate landing sites, and serving as a liaison between the community and the Project.

Most recently, CMEX has also been working with information technologists at Ames to develop a state-of-the-art collaborative web site environment to foster interaction of interested members of the planetary community with the Mars Surveyor Program and the Project Office. The web site will continue to evolve over the next several years as new tools and features are added to support the ongoing Mars Surveyor missions.

WEB SITE FEATURES: A variety of tools have been developed and are accessible at the Ames Mars Surveyor Landing Site Studies web page. These tools include:

A Clickable, Zoomable Map Interface. We have implemented a clickable, zoomable map interface from which web pages for all candidate Mars Surveyor 2001 landing sites can be accessed. Individual landing site web pages include links to workshop abstracts, the PDS image atlas for Viking images, VRML virtual reality environments (see below), and landing site evaluations.

MOC images with annotated Viking context images. We have collected all aerobraking, SPO 1 and SPO 2 phase high-resolution MOC images that lie within the latitude belt being considered for the '01 mission. Each MOC image is associated with an annotated Viking context image that contains the footprint location of each MOC image. Annotated Viking context images are provided by Alfred McEwen (University of Arizona), courtesy of the Mars Surveyor '01 Project. We plan to make subsequent MOC data available at this site in a similar format for regions located within the acceptable latitude band for Mars Surveyor landing sites.

A Postdoc Mars Surveyor Landing Site Studies group. Postdoc (for Post document) is a collaborative, web-based environment that allows individuals to post and retrieve documents in virtually any format, including image, text, slide, spreadsheet, audio and video files. Users can employ Postdoc to propose a landing site, submit both science and engineering evaluations, post supporting image, graphics or word documents of their proposed landing site(s), or create their own email subgroup list for their respective landing sites. Others in the landing site community may request membership to those subgroups from the "owner" of that subgroup. Postdoc creates a common meeting place where the landing site community can post their work on candidate landing sites both to inform and to facilitate collaborations within the community and with the Project.

Low and high-resolution, zoomable, rotatable (VRML) models of landing sites proposed for this 1999 landing site workshop. We have constructed three-dimensional perspective VRML *(Virtual Reality Markup Language)* models for all proposed landing sites. MOLA PEDR (Precision Experiment Data Records) profiles have been incorporated when available and we plan to add MOC data as well. Some sites have the option to view geologic map overlays in this 3D format. Viewing the images with a web browser requires a VRML CosmoPlayer plug-in that is available free (www.cosmosoftware.com). Plug-ins are available for UNIX, Windows and MAC platforms. Information for obtaining and using VRML plug-ins is posted on our web site. Because VRML technology is new, your viewing experience may be "less than satisfying" in some cases. For example, loading two or more consecutive VRML files may cause some browsers to crash. The VRML plug-in is most stable on UNIX machines and least stable on Macintosh platforms. Therefore, we recommend that only the newest versions of the VRML plug-in be used.

A web-based GIS interface for obtaining engineering data of proposed sites. This features is provided by the U.S Geological Survey, courtesy of the Mars Surveyor Project. The interface allows one to easily locate the landing site of interest and to obtain rock abundance, albedo, slope, topography, thermal inertia, and fine component thermal inertia data for any spot on the planet.

PLANNED ENHANCEMENTS: Near-future enhancements to the web site include integration of geology and mineralogy (from TES released data) maps composited with surface images and as overlays on 3D VRML terrains. We also plan to integrate rock abundance, thermal inertia data and landing ellipses. Other future enhancements include the use of Concept Maps as a user interface for links to relevant site data (e.g. abstracts, science evaluations, images, maps, and online reference materials). The goal is to have the Con-

cept Maps createable and editable by peer reviewers in a collaborative fashion.

Collaborative tools will be enhanced to include collaborative whiteboards, collaborative image viewing and annotation, and support for possible Usenet news groups, chat rooms, and/or list-serve mailing lists. Some of these capabilities are already provided on Postdoc, which allows user-uploadable and retrievable materials and threaded mail archives.

The website is intended to be a general repository for the latest Mars mission images, data, and data products that pertain to landing site selection, with on-the-fly image retrieval and auto-mosaicking and VRML creation, with options to include surface images, geological maps, maps of surface composition, and other relevant data.

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